



NWS Burlington 2018 Spring Flood Outlook

VT Emergency Management Security Annual Spring Flood Meetings

State Emergency Operations Center
16 February 2018

Jessica Neiles and Scott Whittier
National Weather Service – Burlington, VT
802-658-0207/802-658-0150



Outline

- “Routine” Flooding Triggers in Vermont
 - Rain, Snowmelt, Ice Jam
- Recap of Winter 2017-18...so far
- Spring Flood Outlook
 - Normal to Slightly Above



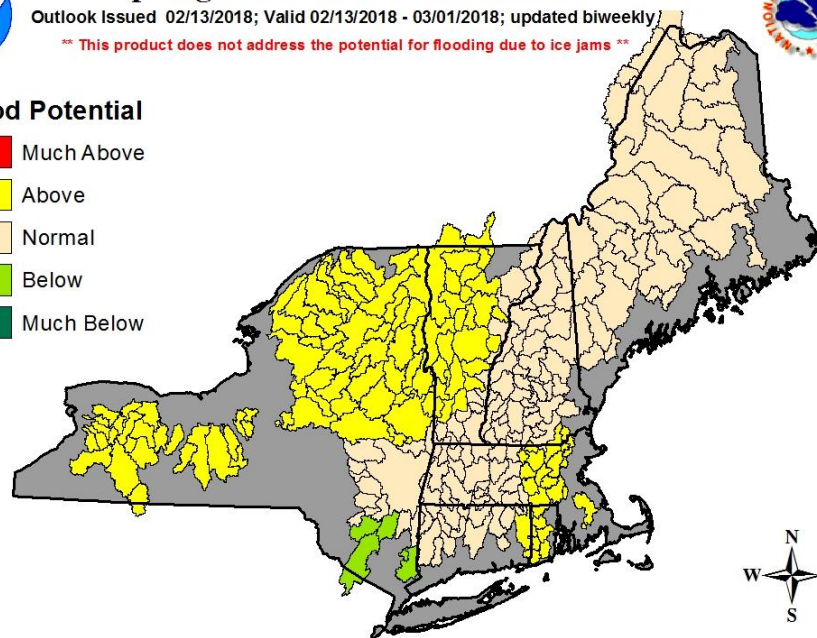
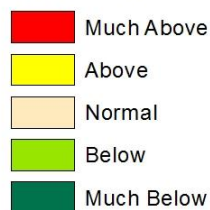
Spring Flood Potential Outlook

Outlook Issued 02/13/2018; Valid 02/13/2018 - 03/01/2018; updated biweekly

**** This product does not address the potential for flooding due to ice jams ****



Flood Potential



Map produced by the Northeast River Forecast Center



Winter-Spring Flooding Causes

"It's All About the Rainfall"

- **Precursors –**
 - **Normal -> Above Normal Snowpack**
 - Snow Depth and Water Content
 - **Substantial Ice Thickness**
 - Existing Ice Jam?
 - **Race between Breakup vs. Melt out**

- **Causative Event**
 - **Significant Warm-up**
 - Promoting snowmelt, increase water flows
 - Ability to lift, move, break-up and Ice Jams
 - **Heavy Rainfall****

***Most important*



Ice Out Scenarios

Thermal (“Melt out”)

- Long, gradual warmth with no significant rainfall
- Mild, sunny days/ Cool, sub-freezing nights (**Last few days**)
- Ice cover thins, weakens and melts in place, or forms minor jams
- Open channels
- Mitigation efforts by communities
 - Leaf debris, wastewater, etc.

Mechanical (“Breakup”)

- Significant Ice thickness
 - **Extended period of Freezing temperatures**
 - Limited thawing
- Increase in River Flow
 - **Rainfall and/or snowmelt**
 - Ice Break up or water running over ice
 - Snow melt alone usually doesn’t do it
- Jam Site – Location where ice stops moving and blocks channel
 - **Change of channel slope**
 - **Intact ice cover – site of freezeup jam**
 - **Impediment – bridge piers**





Ice Out Scenarios

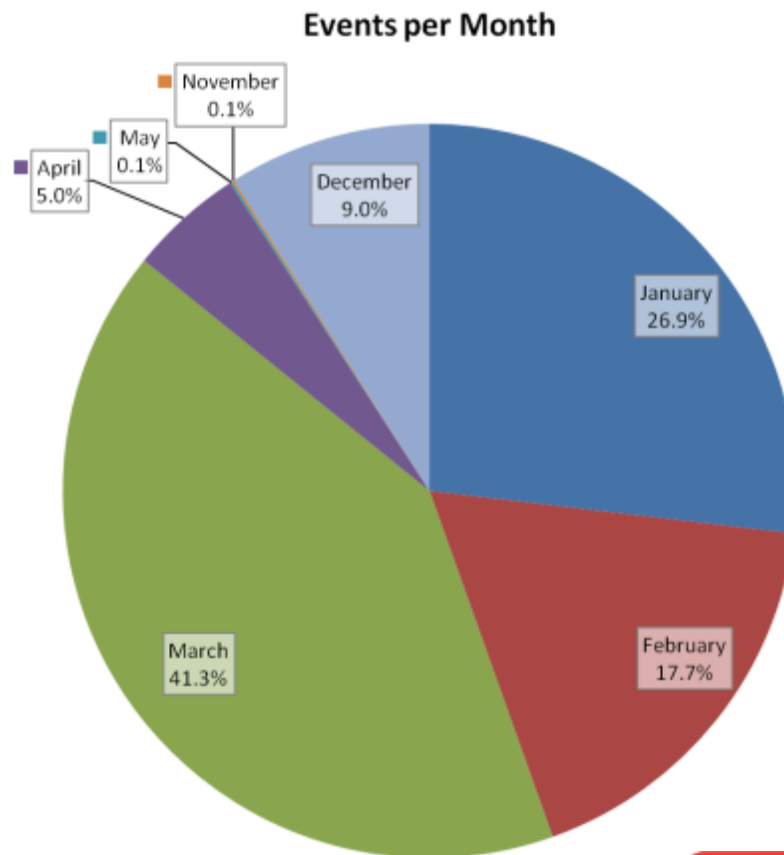
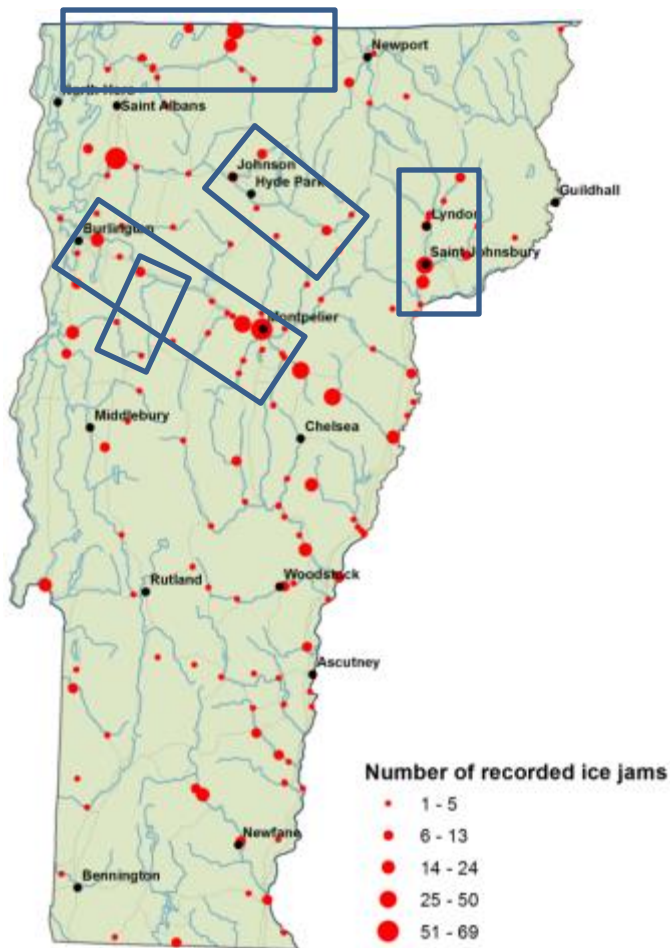
- Every spring is a race between break up vs. melt out
- Usually it's a combination of both
- More melting → Ice jam flooding less likely
- Less melting → Ice jam flooding more likely





Recorded Ice Jams in Vermont

[Woodford, VT Ice Jam - 01/12/18](#)



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Recent Winter/Spring Flooding

Tale of Two Winters and
Subsequent Flooding
2015-16 and 2017-18

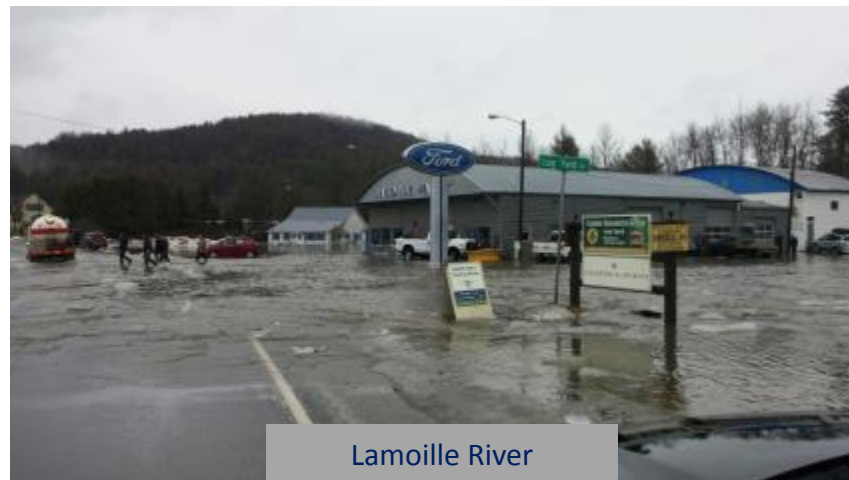


25 February 2016

Despite...a VERY MILD and "Snow-less" Year



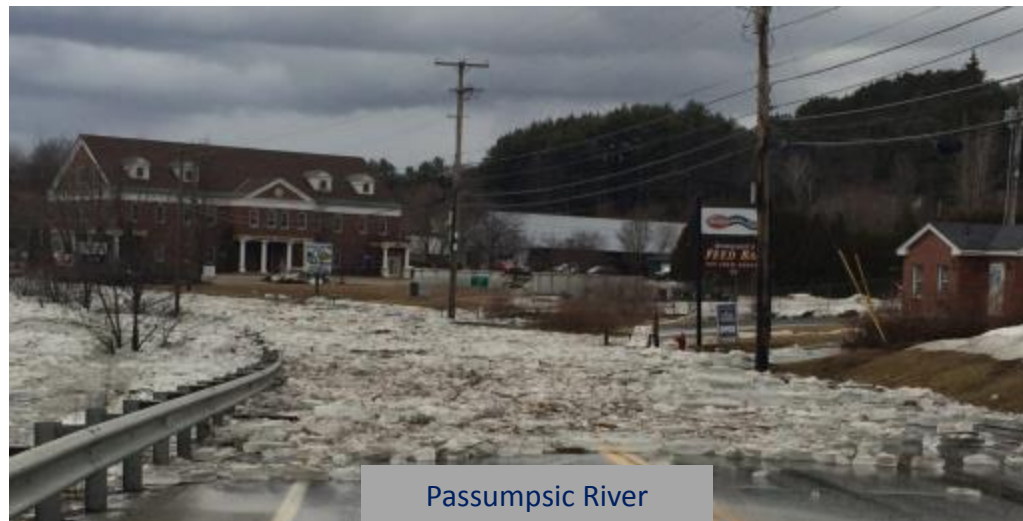
Passumpsic River



Lamoille River



Mad River

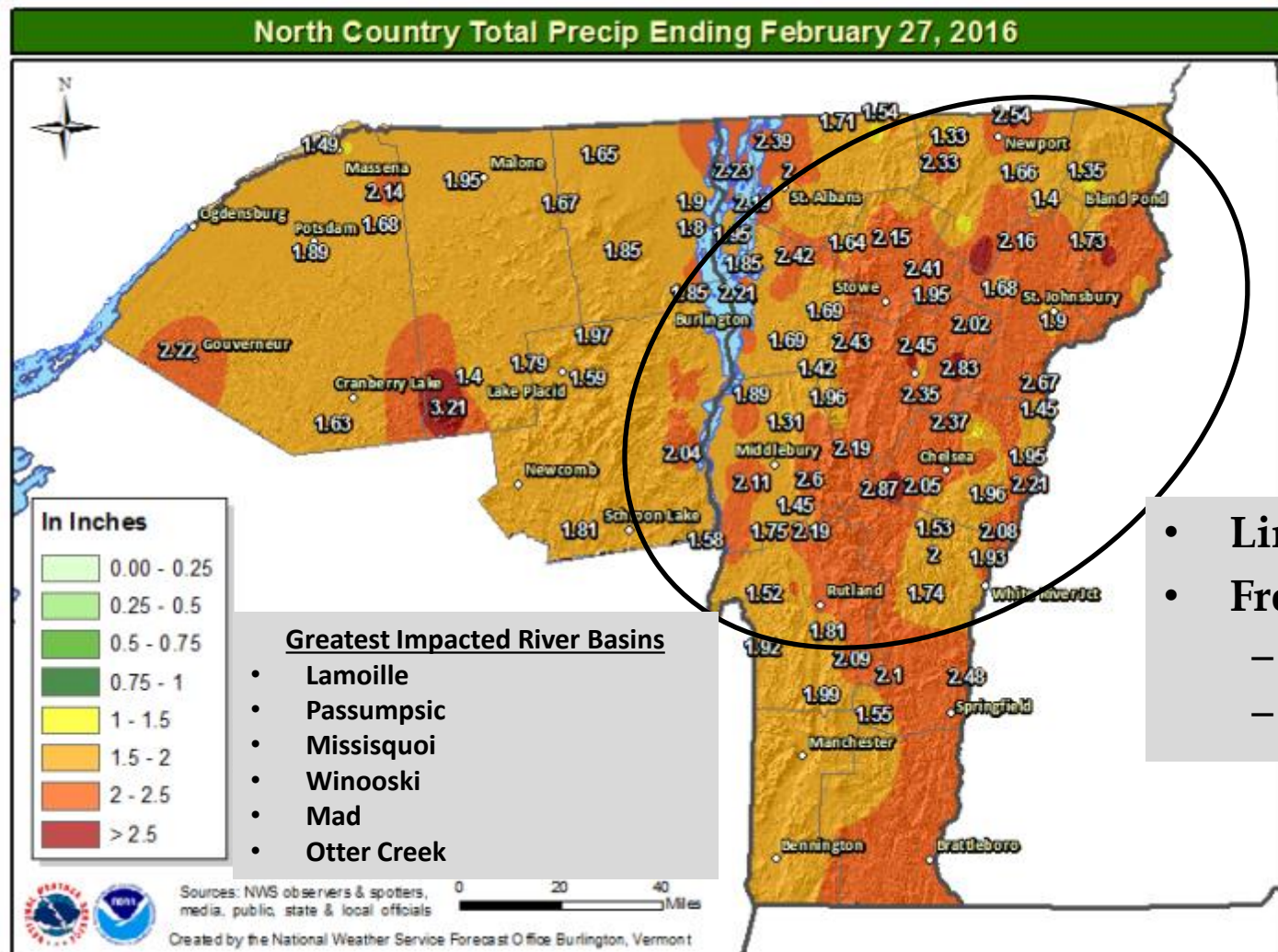


Passumpsic River



25 February 2016 Flooding

Widespread 1.5 to 2.5 inches of Rainfall in Most Vulnerable Locations
on Frozen Ground

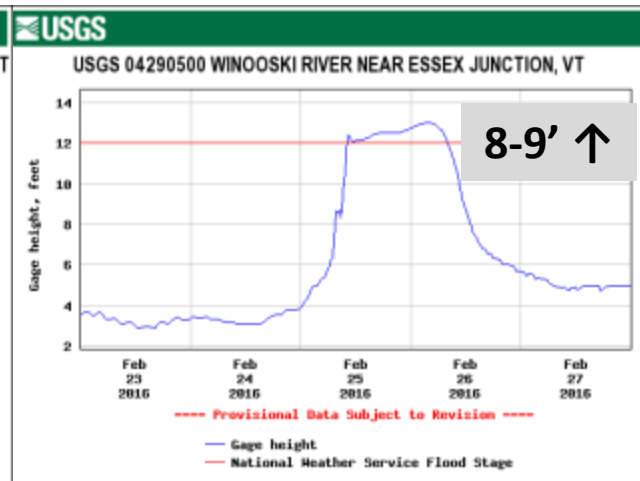
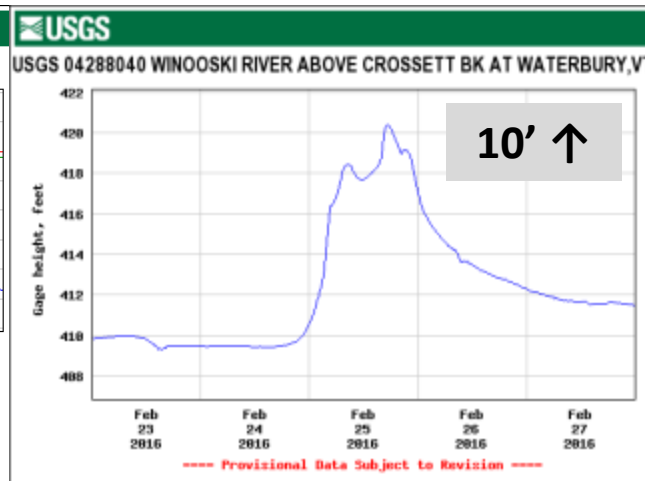
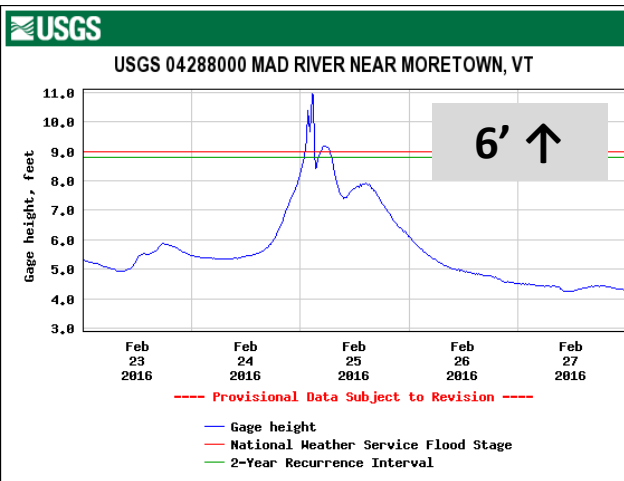
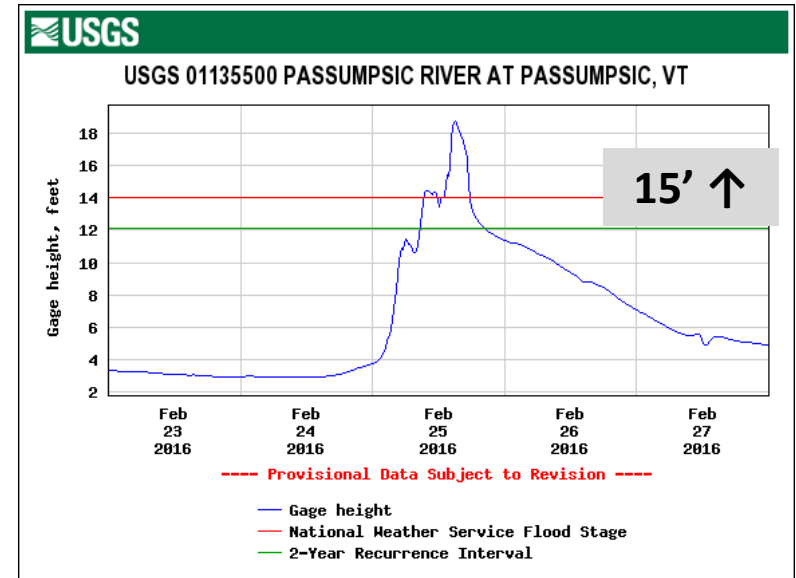
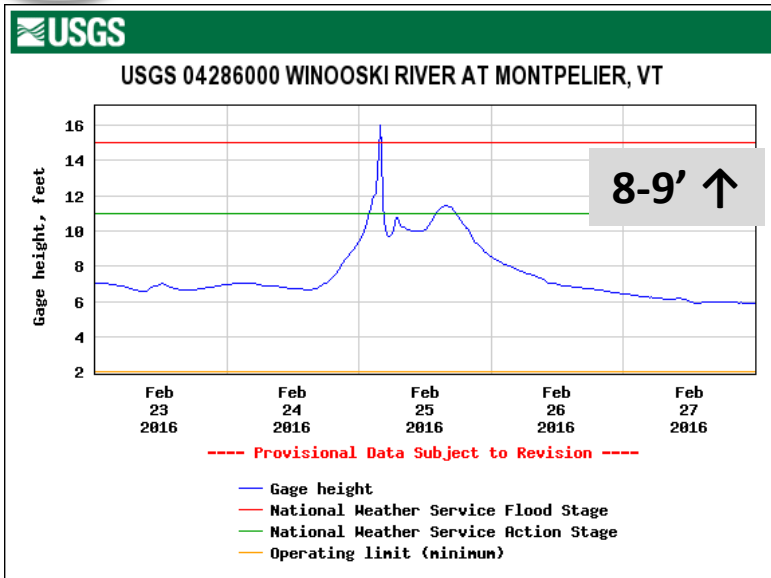


- Limited Snow Cover
- Frozen Ground
 - Less Absorption
 - More Runoff



Response of Watersheds across VT

Rule of Thumb: Water Rise must be 2-3X Ice Thickness to Lift, Move or Breakup Ice





13-15 January 2018

Record Cold and Normal to Above Normal Snowfall then Rapid Thaw



Passumpsic River



Lamoille River at Johnson



Winooski at Montpelier



Missisquoi River



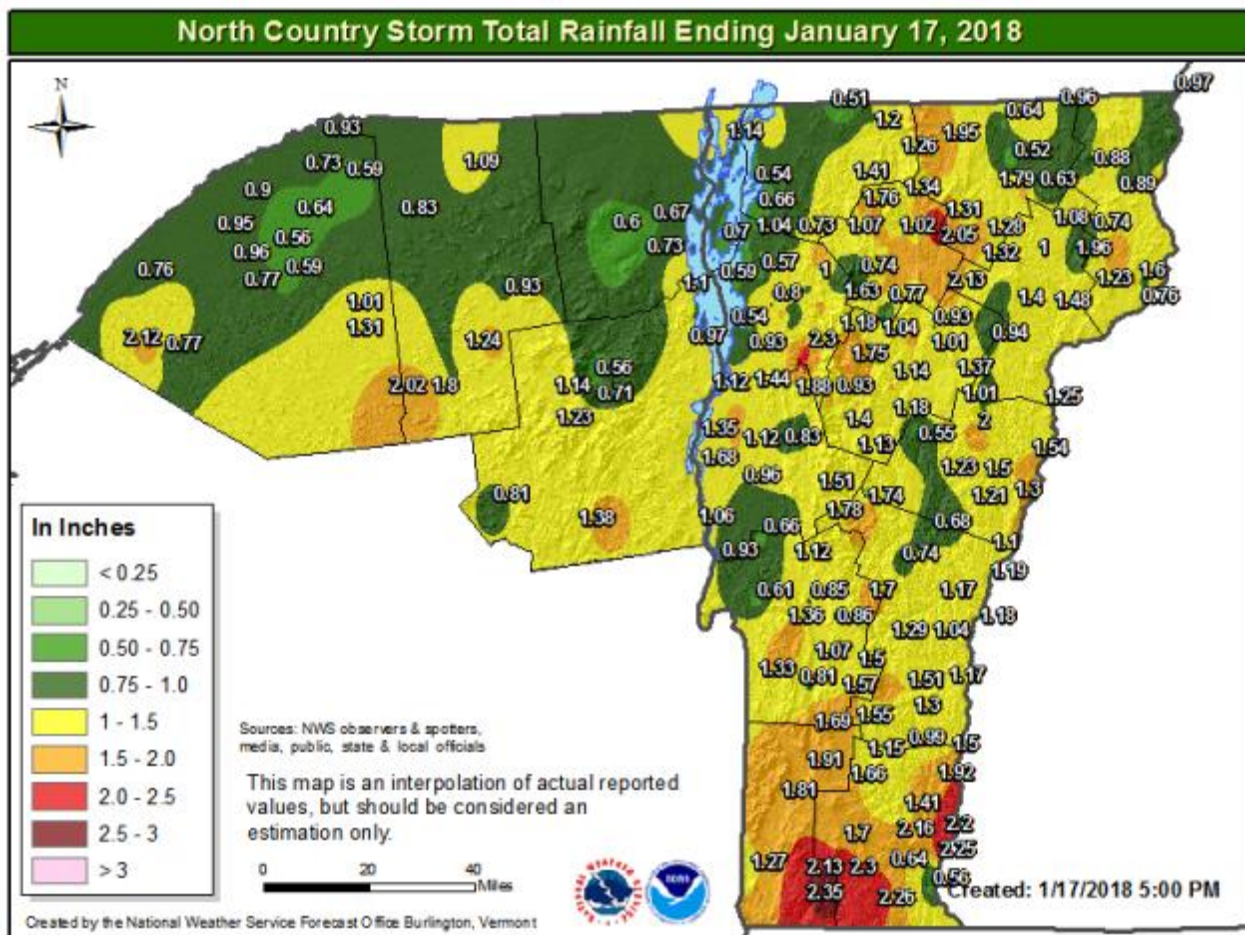
13-15 January 2018 Flooding

Widespread 1 to 2 inches of Rainfall

8-16 inches of Snow depth lost...perhaps 1-2" Water Equivalent

Primarily ICE JAM Related Flooding

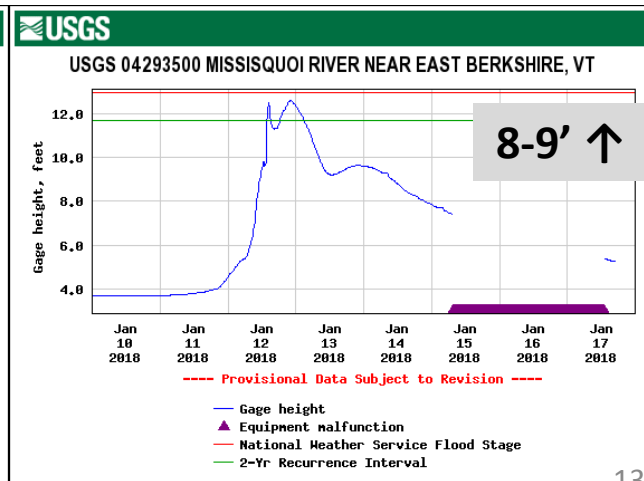
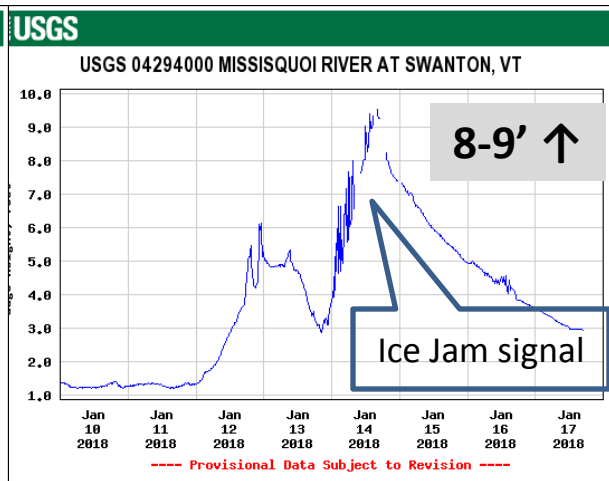
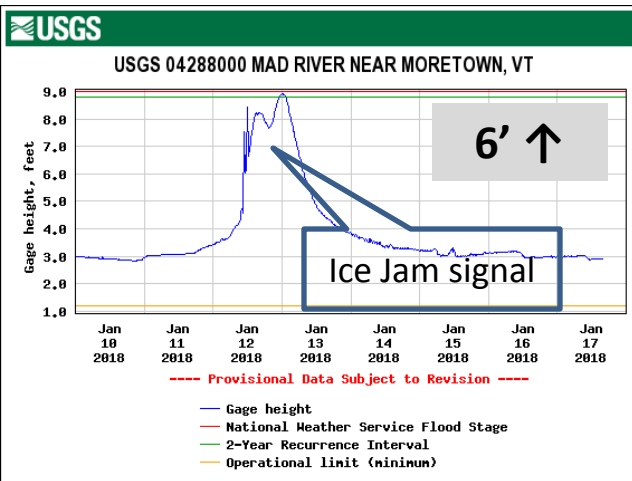
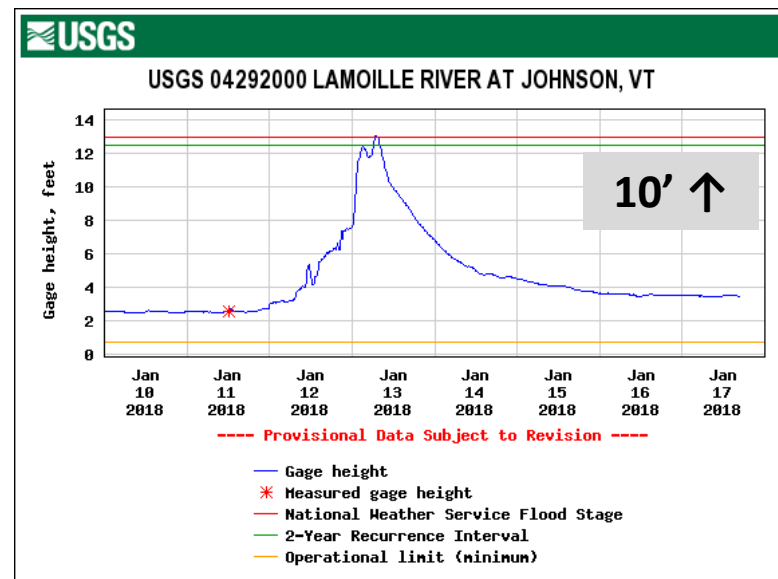
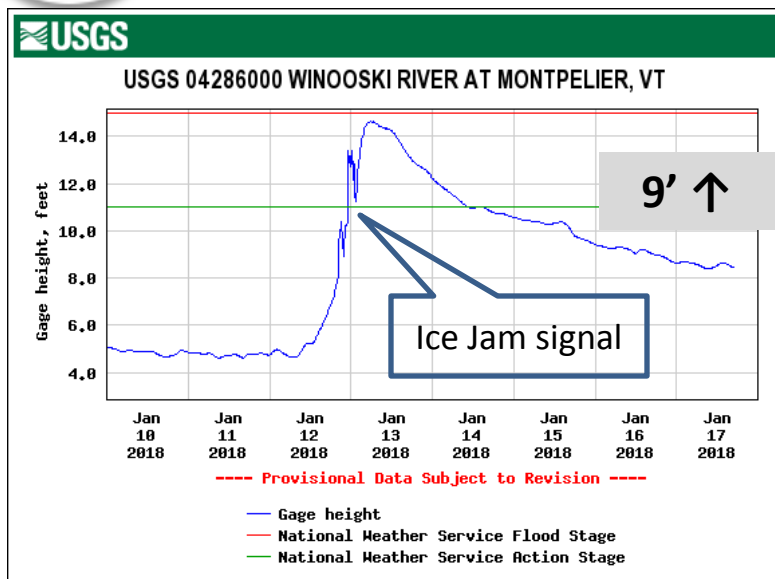
- Missisquoi
- Winooski
- Lamoille
- Passumpsic
- Mad
- New Haven
- Connecticut





Response of Watersheds across VT

Rule of Thumb: Water Rise must be 2-3X Ice Thickness to Lift, Move or Breakup Ice





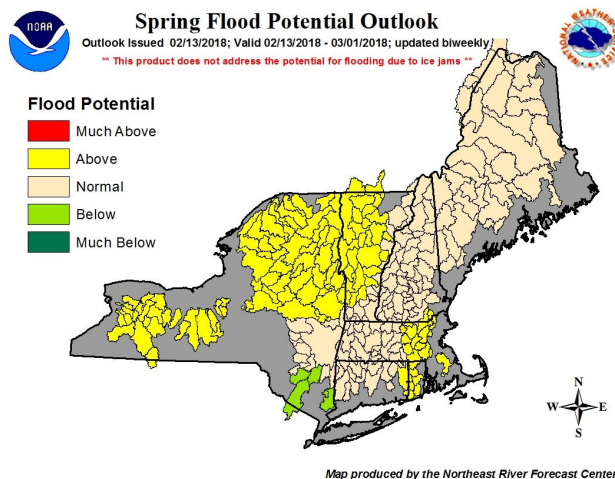
Recap of Winter 2017-18, so far...

Near Normal,

MUCH Colder than Winter 2015-16 and 2016-17

Normal Snowfall

and the Winter/Spring Flood Outlook



Map produced by the Northeast River Forecast Center

14



Temperature Comparison

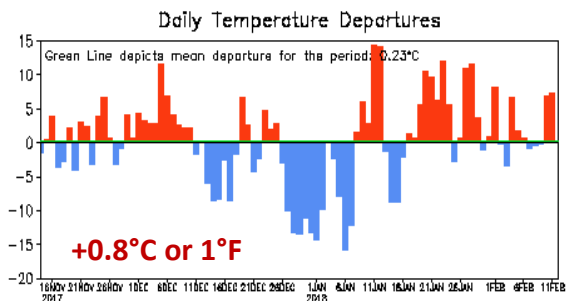
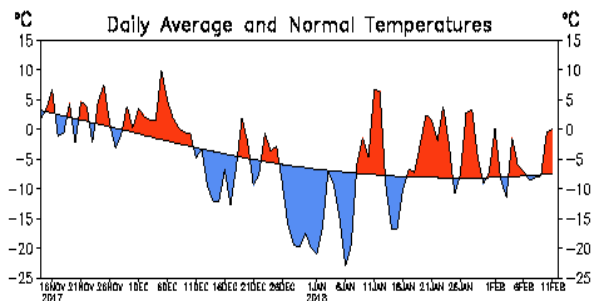
Meteorological Winter (Dec-Jan-Feb) Normal Mean: 22.0°F

Winter 2017-18	Departure
December 2017	-3° to -6°
January 2018	+1° to +2°
February 2018	+1.5° to +4°

Rank	Season	Mean Avg Temperature
1	2015-2016	30.2
2	2001-2002	28.8
3	2016-2017	28.1
4	2011-2012	27.8

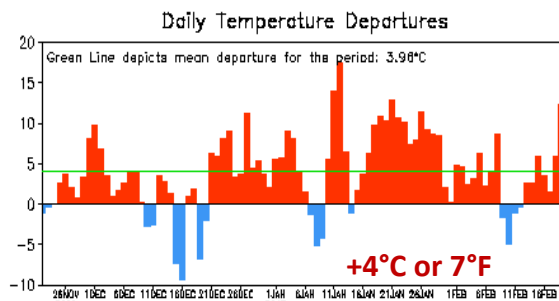
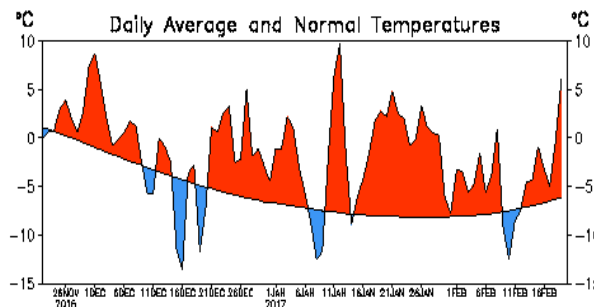
Winter 2017-18

BURLINGTON, VERMONT



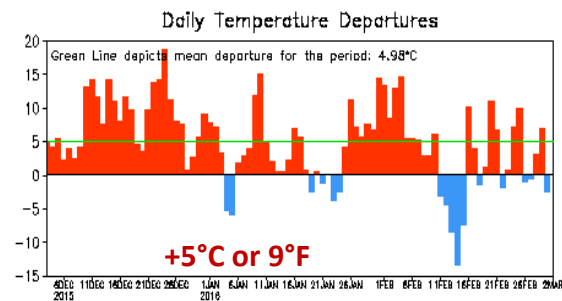
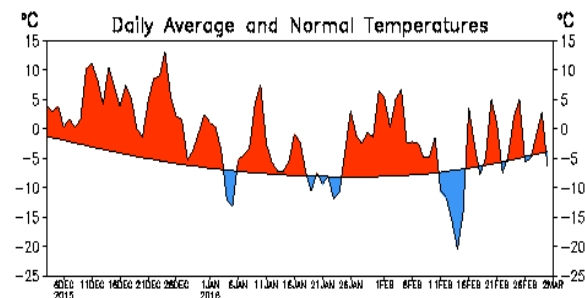
Winter 2016-17

BURLINGTON, VERMONT



Winter 2015-16

BURLINGTON, VERMONT



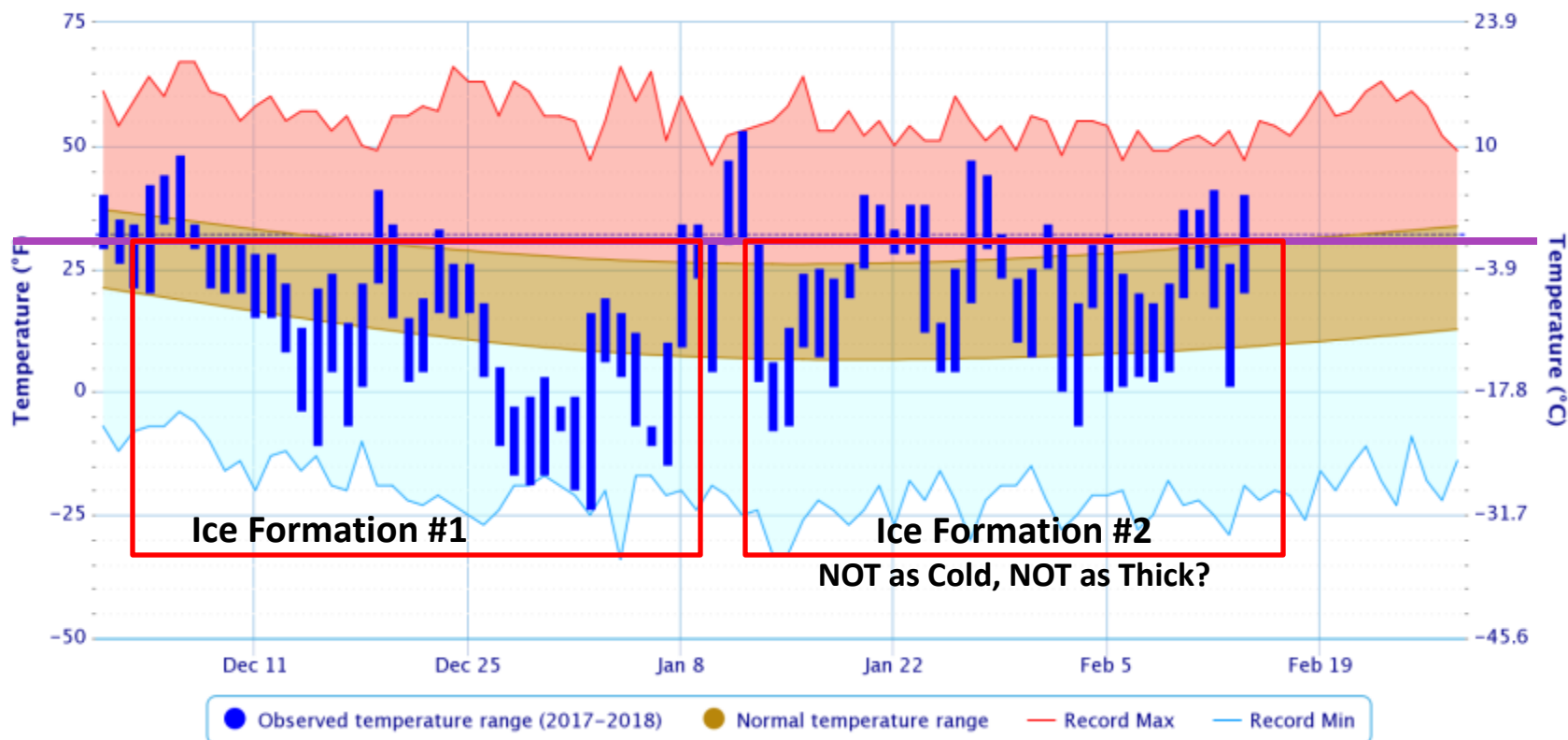


Meteorological Winter So Far...

Montpelier, VT

Daily Temperature Data – BARRE MONTPELIER KNAPP STATE AP, VT

Period of Record – 1948-06-01 to 2018-02-14. Normals period: 1981-2010. Click and drag to zoom chart.



Powered by ACIS



Known Ice Jam Locations

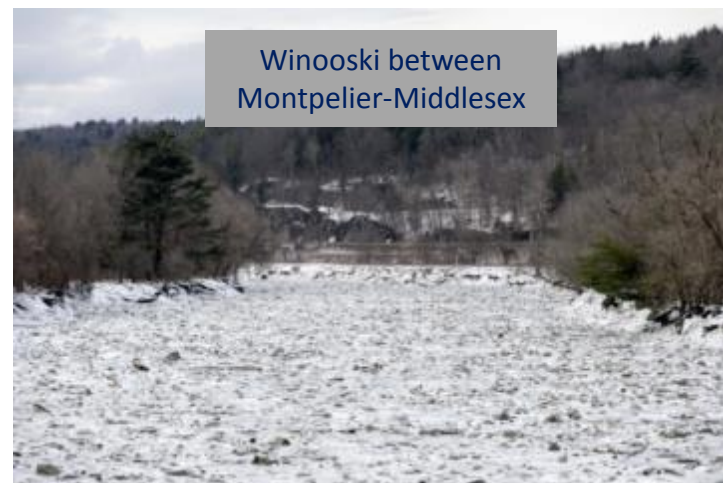
Missisquoi



Lamoille near Johnson



Winooski between
Montpelier-Middlesex





Lamoille River

Ithiel Falls

MORE ICE
Downstream

Heel of Previous
Ice Jam

Gihon River

NEW Ice

Johnson

Measure distance
Click on the map to add to your path
Total distance: 3.57 mi (5.74 km)



Snow Cover 15 February 2018

Rebound after January Thaw

Snow Depths

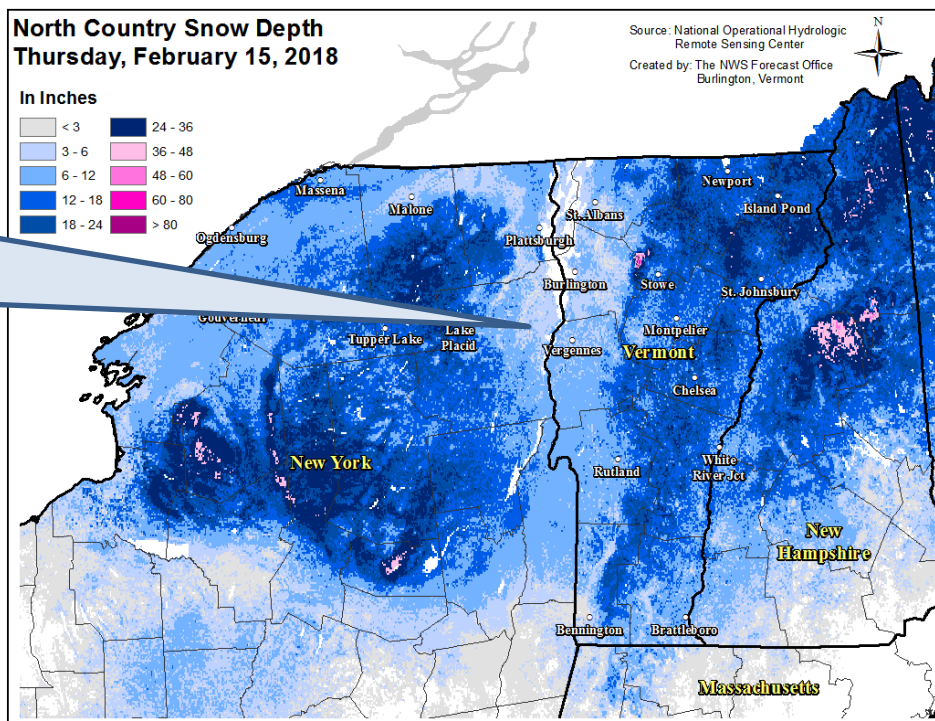
Trace to 6 inches in Western VT Valleys
6 to 15 inches in Other Valleys (15-24" NE VT)
18-30 inches in Mid-terrain
3-4+ feet across Higher Summits
Near to Below Normal

North Country Snow Depth Thursday, February 15, 2018

In Inches



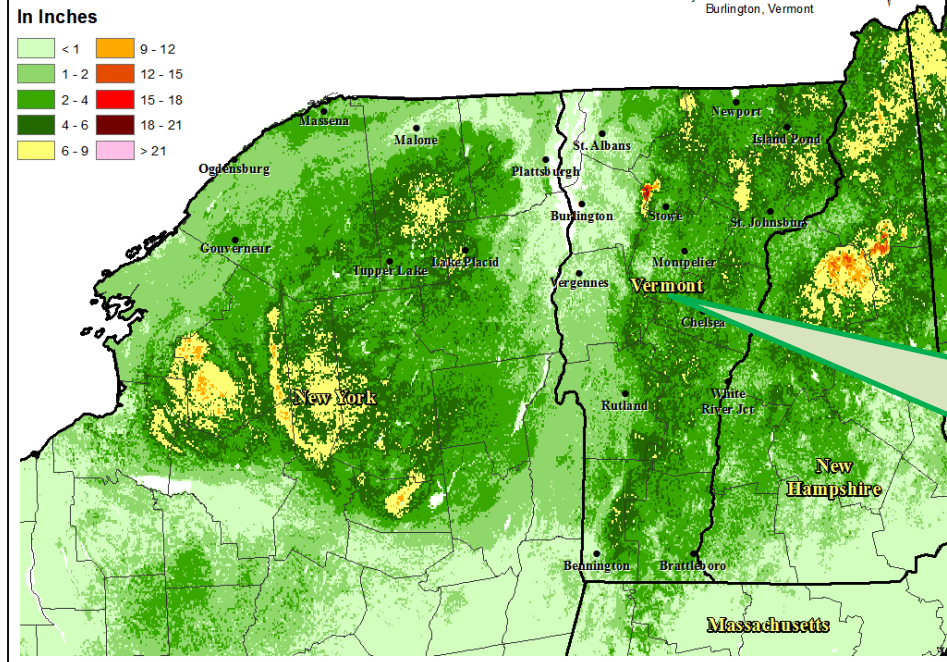
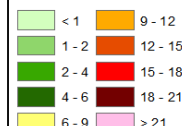
Source: National Operational Hydrologic
Remote Sensing Center
Created by: The NWS Forecast Office
Burlington, Vermont



North Country Snow Water Equivalent Thursday, February 15, 2018

Source: National Operational Hydrologic
Remote Sensing Center
Created by: The NWS Forecast Office
Burlington, Vermont

In Inches



Water Equivalents (Water Content)

≤ 1 inch in Western VT Valleys
2-4 inches in Other Valleys (3-6" NE VT)
4-7 inches across Mid-terrain
6-10+ inches across Higher Summits
Near to Below Normal



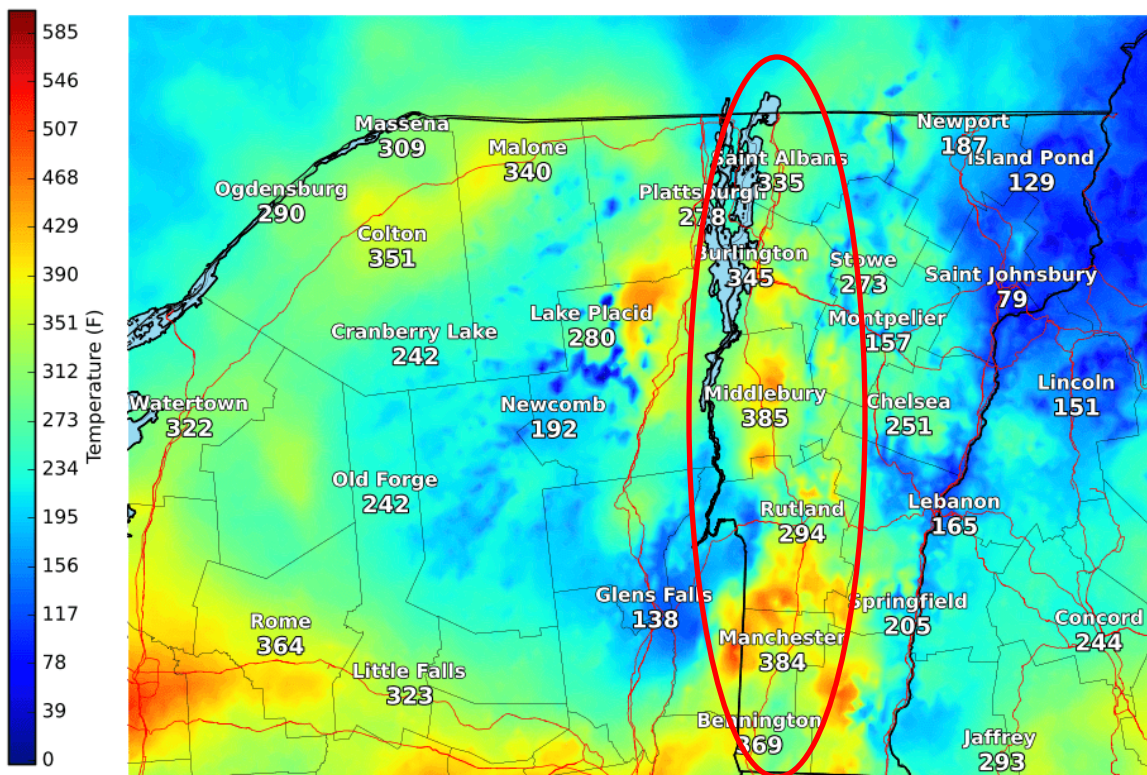
Thawing Degree Hours (since Wednesday)

Cumulative Total Of Hours and Magnitude Above Freezing

Key Level 300-350 Thawing Degree Hours

Thawing Degree Hours

Valid: 7 AM EST February 14, 2018 to 7 AM EST February 16, 2018



National Weather Service
Burlington, VT
02/16/2018 07:46 AM EST

Follow Us:   
weather.gov/Burlington

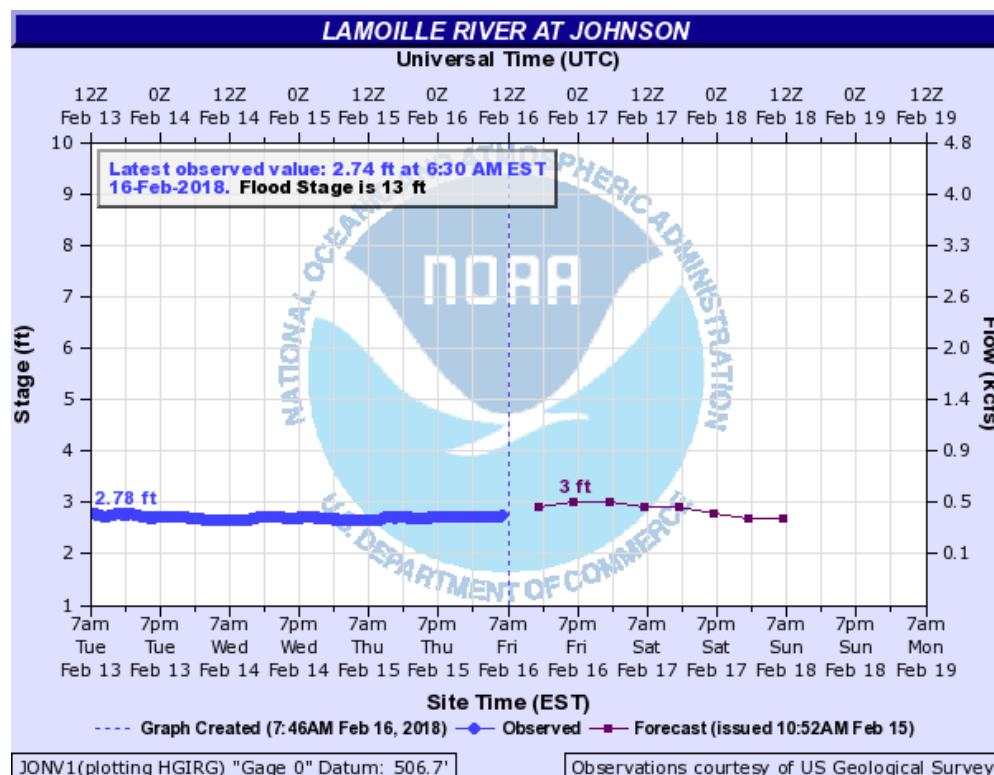
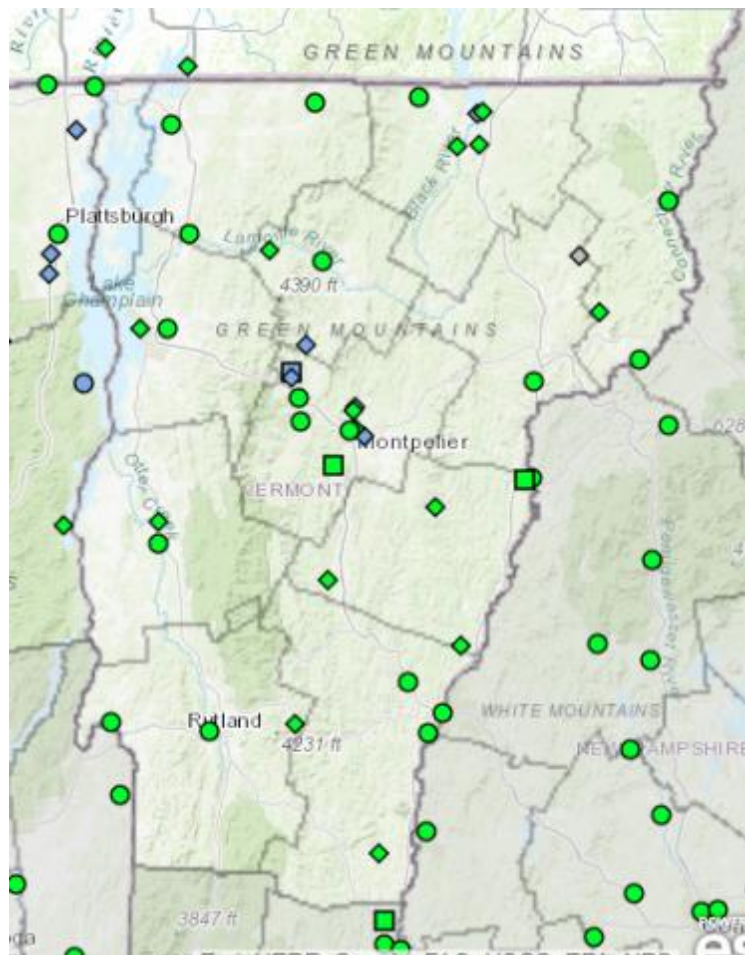


Current Stream Flows across VT

Currently: Normal No real changes through Holiday weekend

Milder temperatures the last few days have caused small streams in Western VT to rise.

Allen Brook in Williston rose substantially and moved out ice.

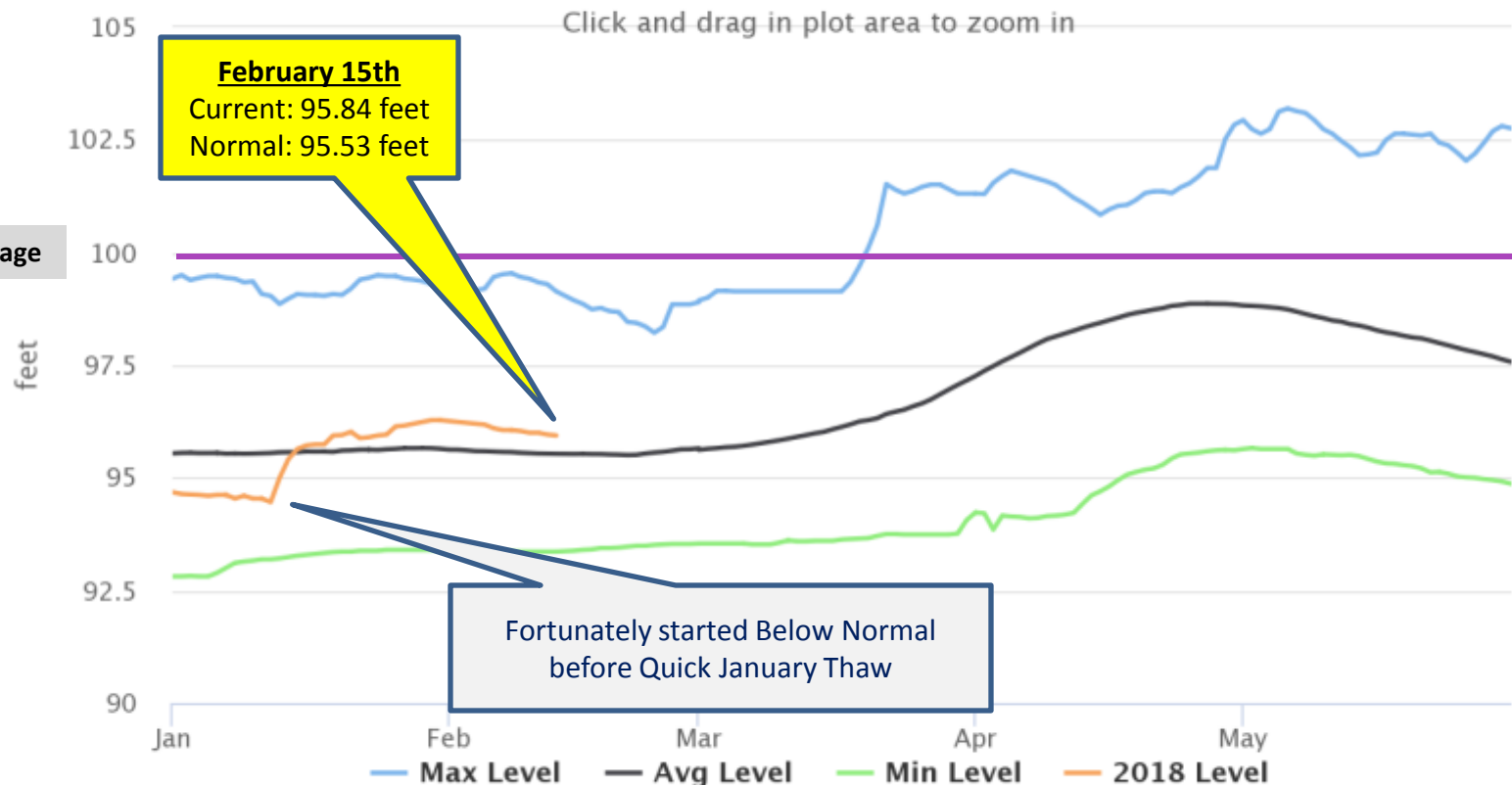




Lake Champlain

No Immediate Concerns – ALL About Future Precipitation through May

Lake Champlain Extremes and 2018 Level



Highcharts.com

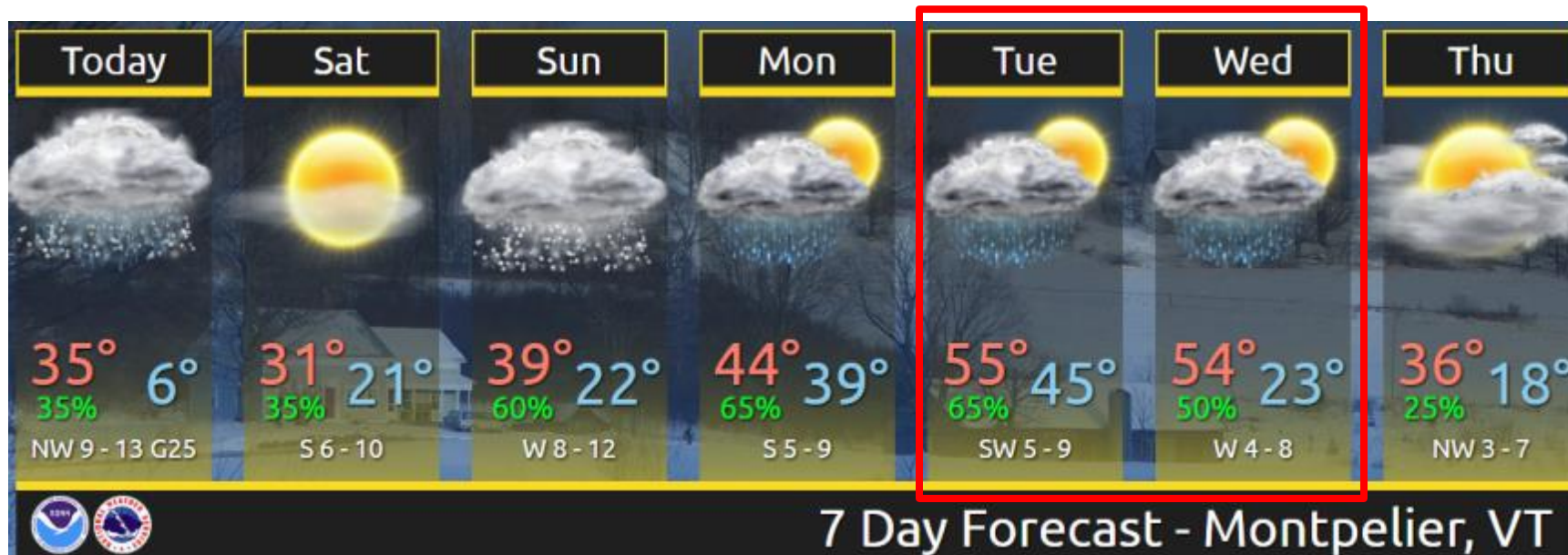


Next 7 Days...

Need to Pay Attention to early-mid next week

Colder

Milder ----->

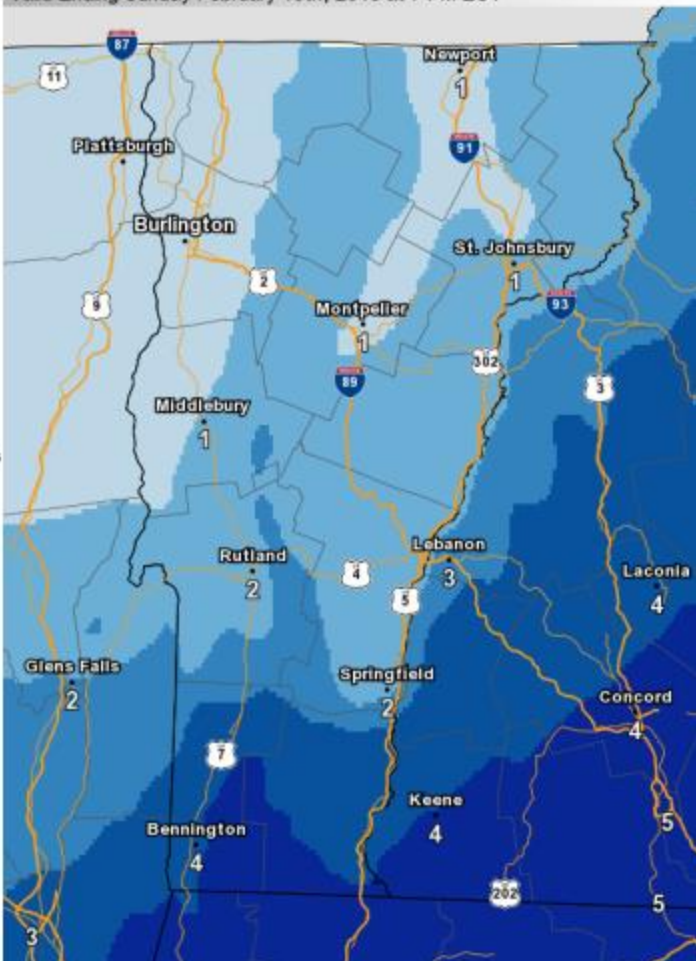




Late Saturday Night/Early Sunday

Forecast Snowfall

Valid Ending Sunday February 18th, 2018 at 7 PM EST

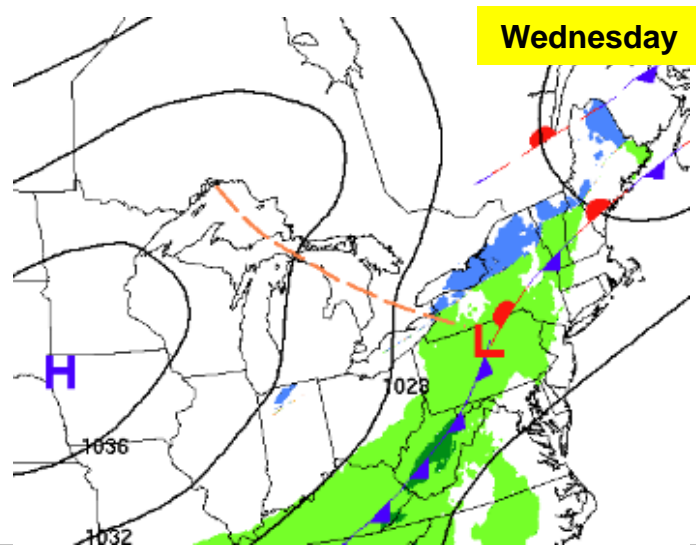
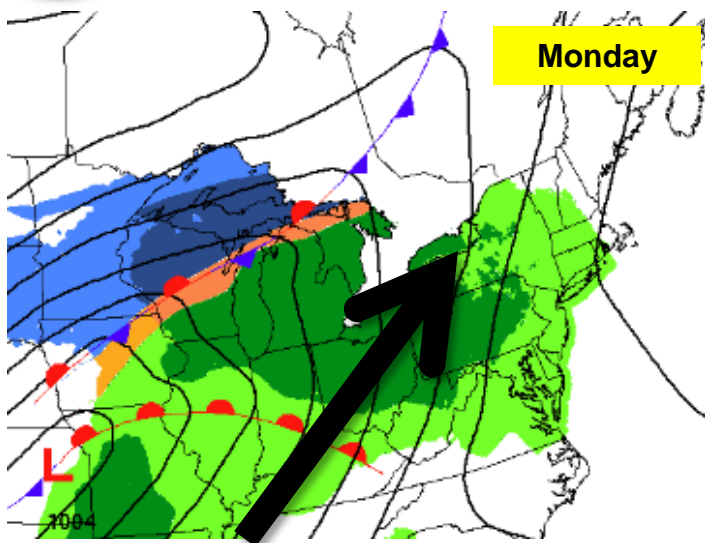


Graphic Created
February 16th, 2018
8:28 AM EST

- ✓ Low pressure passes to our south.
- ✓ Temperatures cold enough for light snow.
- ✓ A few inches at best.



Monday - Wednesday



- ✓ A persistent south to southwest flow pattern develops.
- ✓ Moisture spreads into the region Monday night through early Wednesday.
- ✓ **Above normal temperatures.**
 - ✓ Highs in the 40s/50s
 - ✓ Lows ABOVE FREEZING
- ✓ Most of the precipitation will fall in the form of rain.
- ✓ **½ inch of rain expected**
- ✓ Will continue to monitor closely, but forecast has been very consistent over the last few days.

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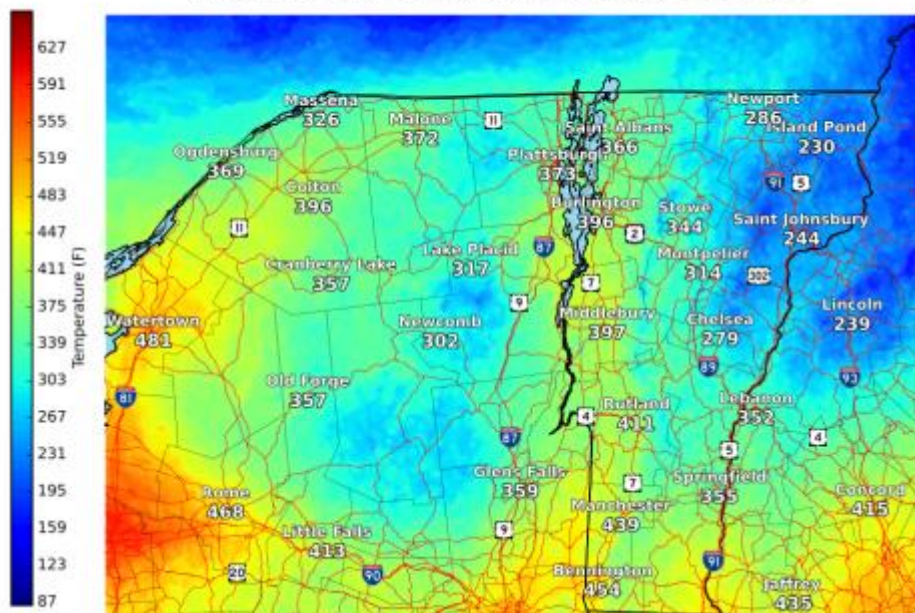
Thawing Degree Hours

Cumulative Total Of Hours and Magnitude Above Freezing

Key Level 300-350 Thawing Degree Hours

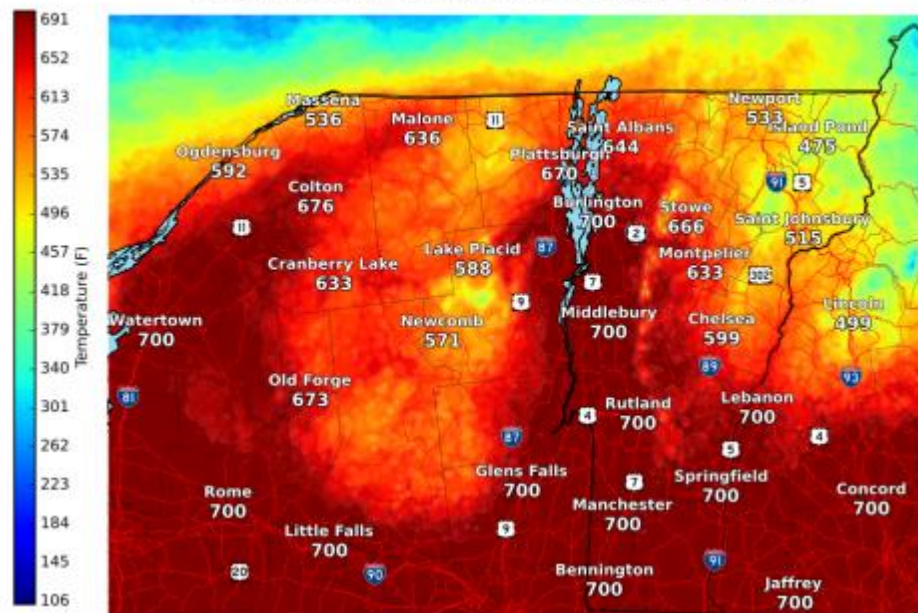
Through Tuesday

Total Thawing Degree Hours thru 00z Wed
Valid: 1 PM EST February 19, 2018 to 7 PM EST February 20, 2018



Through Wednesday

Total Thawing Degree Hours thru 00z Thursday
Valid: 1 PM EST February 19, 2018 to 7 PM EST February 21, 2018





River Level Outlooks – Next 7 Days

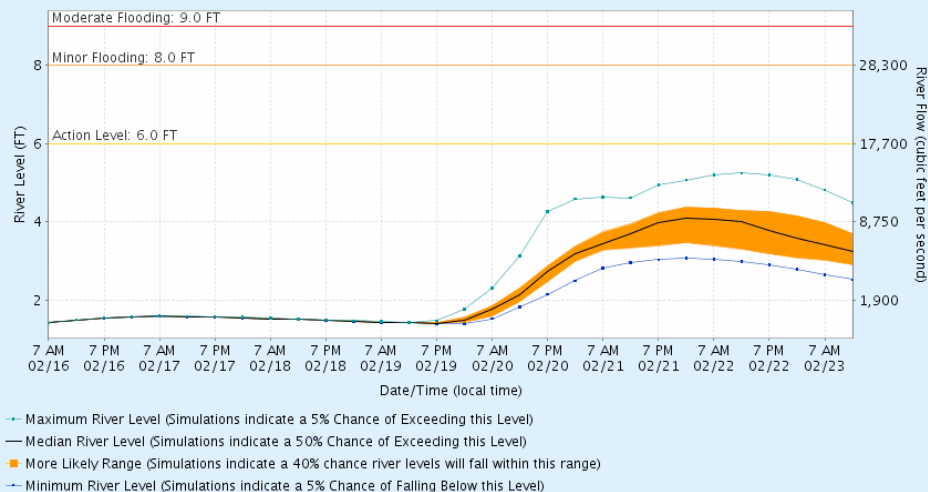
Current Streamflow across VT - NORMAL



7 Day GEFS Potential River Levels

Used to Estimate the Chance of Flooding and the Range of Possible River Levels

Missisquoi River at Swanton, VT (SWAV1)



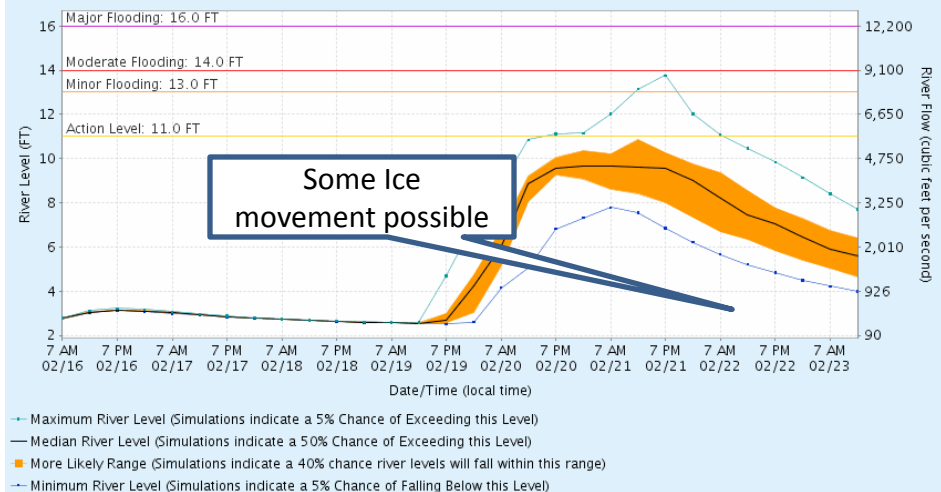
02/16/2018 06 UTC GEFS Model



7 Day GEFS Potential River Levels

Used to Estimate the Chance of Flooding and the Range of Possible River Levels

Lamoille River at Johnson, VT



02/16/2018 06 UTC GEFS Model

Missisquoi at Swanton

- Some ice jams still in place, but little change in river flow expected through weekend, **but be alert early-mid next week.**
- Graphs available at: <http://www.weather.gov/erh/mmefs>

Lamoille River @ Johnson, VT



8-14 Day Outlooks

Normals - Highs: Low to Mid 30s Lows: Teens

Above Normal Temperatures

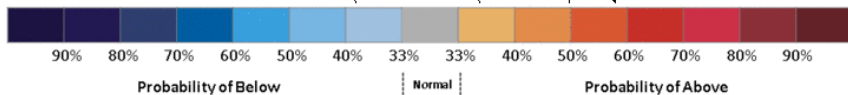
Near Normal Precipitation

Perhaps More Rain
Late Next Week



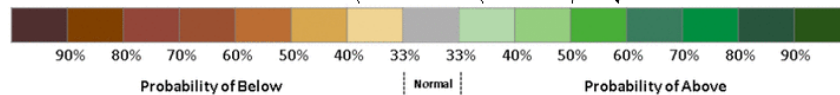
8-14 DAY OUTLOOK
TEMPERATURE PROBABILITY
MADE 15 FEB 2018
VALID FEB 23 - MAR 01, 2018

DASHED BLACK LINES ARE CLIMATOLOGY
(DEG F) SHADED AREAS ARE FCS*
VALUES ABOVE (A) OR BELOW (B) NORMAL
GRAY AREAS ARE NEAR-NORMAL



8-14 DAY OUTLOOK
PRECIPITATION PROBABILITY
MADE 15 FEB 2018
VALID FEB 23 - MAR 01, 2018

DASHED BLACK LINES ARE CLIMATOLOGY
(10THS OF INCHES) SHADED AREAS ARE FCS*
VALUES ABOVE (A) OR BELOW (B) NORMAL
GRAY AREAS ARE NEAR-NORMAL



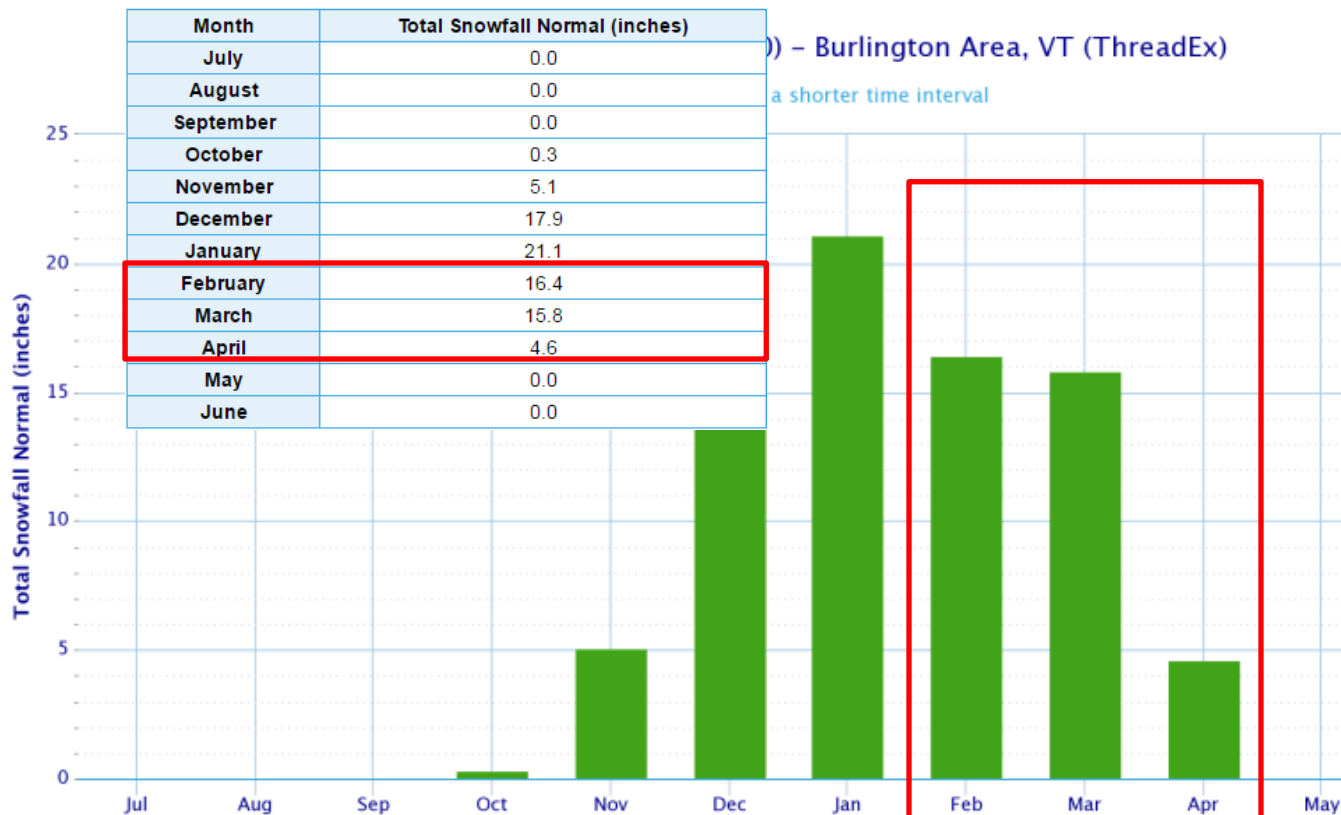
<http://www.cpc.ncep.noaa.gov/>



It's Still Winter...

20-25% of Snowfall occurs after March 1st

LAST YEAR (2017) - Biggest Snow in several years occurred March 14th



) - Burlington Area, VT (ThreadEx)

a shorter time interval

March Snowfall

Year	Total Snowfall
2001	47.6
2002	15.0
2003	8.3
2004	9.7
2005	18.0
2006	16.3
2007	21.8
2008	13.0
2009	7.8
2010	0.9
2011	29.3
2012	5.9
2013	16.2
2014	25.4
2015	4.4
2016	1.8
2017	36.8

Powered by ACIS



Spring Flood Outlook – “Near Normal”

Issued every 2 weeks on Thursday – NEXT is March 1st

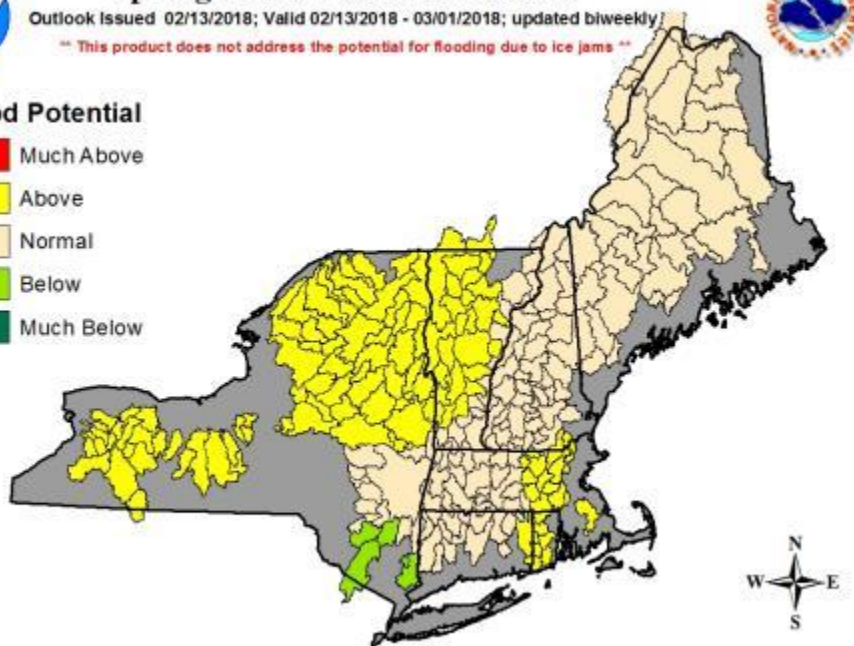


Spring Flood Potential Outlook

Outlook Issued 02/13/2018; Valid 02/13/2018 - 03/01/2018; updated biweekly

“ This product does not address the potential for flooding due to ice jams ”

Flood Potential



Map produced by the Northeast River Forecast Center

- **NORMAL to Slightly ABOVE**
- **Antecedent Conditions**
 - Near to Below Normal Snow packs
 - Normal to Above River Ice
 - Previous Ice Jams *“locked in place”*
- **Monitor Future Forecasts and River Ice conditions**
- **Greatest Threat to Flooding**
 - Above Normal Rainfall
 - Sudden Warm-up / Melting

<http://www.weather.gov/nerfc/springfloodpotential> (Graphic)

<http://w1.weather.gov/data/BTV/ESFBTV> (Text)

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We Need Your Assistance

"We're in this together"

In order to provide the best services possible, whether warning a neighboring community and/or focusing on a specific location for first responders, we need to know...



- **WHAT:** Flooded road, ice jam, branches/trees/wires down, numerous vehicles off the road due to snow/icy roads.
- **WHERE:** As specific a location as possible.
- **WHEN:** Time of event. *Please relay the information as quickly as possible, as this allows us to better alert neighboring communities or on-scene responders.*



- **HOW:** Call (802) 863-4279 / 658-0150 / 658-0207

e-mail: nwsbtv.info@noaa.gov

Please add NWS Burlington to your notification list or EAP





Questions???

Please feel free to contact us 24/7 via:

1. Telephone: [802-863-4279](tel:802-863-4279)
2. NWSChat for eligible & registered users at <https://nwschat.weather.gov/live/>
3. Email: nwsbtv.info@noaa.gov ****New e-mail address****



NWS Burlington



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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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Local forecast by:
"City, ST" or ZIP code
Enter location: Go
[Location Help](#)

News Headlines

- [Wind Advisory in Effect for Portions of the Area Noon through Midnight Wednesday](#)
- [Strong El Nino Sets The Stage For 2015-2016 Winter Weather - NOAA's Official U.S. Winter Outlook](#)
- [The 2015 Fall Edition of The Four Seasons Newsletter is Available!](#)

NWS Forecast Office Burlington, VT
[Weather.gov](#) > Burlington, VT

Burlington, VT
Weather Forecast Office

Current Hazards Current Conditions Radar Forecasts Rivers and Lakes Climate and Past Weather Local Programs

Click on the map below to zoom in.

Watches, Warnings & Advisories

- High Wind Warning
- Small Craft Advisory
- Wind Advisory
- Hazardous Weather Outlook

Last Map Update: Tue, Oct. 27, 2015 at 4:12:10 pm EDT

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